

Notice of Allowability

Application No.

10/083,773

Examiner

Jason R. Kurr

Applicant(s)

WELSH ET AL.

Art Unit

2615

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Applicant's amendment dated February 2, 2007.
2. ☒ The allowed claim(s) is/are 1-19, 22 and 23.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 2/23/07.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with John Carlson on February 8, 2007 and February 23, 2007.

The application has been amended as follows:

Claims:

- 1. (Currently Amended) A method for controlling a physical variable at a frequency of interest (f_d) including the steps of:
 - a) sampling the physical variable at a sample frequency less than twice the frequency of interest (f_d);
 - b) calculating at least one control command based upon the sampling of the physical variable;
 - c) generating a force for controlling the physical variable based upon the control command;
- wherein the physical variable is sound or vibration, and
- wherein the force is sound or vibration.--

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-- 14. (Currently Amended) A method for analyzing a physical variable having a first frequency of interest f_1 and a second frequency of interest f_2 in a noise or vibration control system, including the steps of:

a) identifying first harmonic components a_{k1} , b_{k1} of the first frequency of interest f_1 ;

b) down-sampling the harmonic components a_{k1} , b_{k1} at an intermediate frequency f_{u1} ;

c) identifying second harmonic components a_{k2} , b_{k2} of a difference between the first frequency of interest f_1 and the second frequency of interest f_2 ;

d) down-sampling the harmonic components a_{k2} , b_{k2} at an update frequency f_{u2} ; and

e) analyzing information at the first frequency of interest f_1 and the second frequency of interest f_2 based upon said harmonic components a_{k1} , b_{k1} and a_{k2} , b_{k2} .--

-- 17. (Currently Amended) An apparatus for sensing physical variables at a reduced rate in a noise or vibration control system comprising:

a sensor adapted to sense physical variables at a sample frequency (f_s) less than twice a frequency of interest (f_d), and to generate a sensed signal as a function of the sensed physical variable; and

a control circuit adapted to establish the frequency of interest (f_d), and to establish the sample frequency (f_s),

wherein the control circuit filters the sensed signals to extract a frequency range with a lower bound given by $(2n-1) \cdot f_s/2$ and an upper bound given by $(2n+1) \cdot f_s/2$, where n is an integer chosen so that the frequency of interest (f_d) is within the extracted frequency range,

wherein the control circuit generates a control command based upon the sensed signal to control the physical variable.--

-- 20. (Cancelled) --

-- 21. (Cancelled) --

-- 22. (Currently Amended) The method of claim 1 wherein the force generated in said step c) reduces the amplitude of the physical variable. --

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

The general concept of sensing physical variables such as sounds or vibrations for the purpose of controlling the variables by supplying the sensed information to a control unit which in turn generates a compensating force as to be applied to the physical variable was known in the art at the time of the invention, as evidenced by Jolly et al (US 5,845,236), Shoureshi (US 5,629,986) and Southward et al (US 5,627,896).

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The general concept of sampling data at less than the Nyquist rate (i.e. less than twice the frequency of interest, "under-sampling") was well known in the art at the time of the invention for applications such as receivers, as evidenced by the Bazarjani et al reference (US 6,005,506). However, the examiner has not found prior art that teaches or suggests the modification of the above references to provide the under-sampling methods in a sound or vibration control system as defined in the independent claims 1 and 17. Other prior art has been cited herein regarding sound/vibration control and under-sampling data. However the other prior art of record also fails to teach or provide suggestion to arrive the combination of the elements and steps presented in the independent claims, again when said elements or steps are collectively considered in regards to each claim. For at least the reasons listed above, the dependent claims of claim 1 are also allowed in view of their dependency upon the independent claim 1.

The general concept of sampling physical data such as sound or vibrations for the purpose of controlling the physical phenomena was known in the art at the time of the invention, as evidenced by Jolly et al (US 5,845,236), Shoureshi (US 5,629,986) and Southward et al (US 5,627,896). However, the examiner has not found wherein the sampling of data in an active sound/vibration control includes all of the claimed details as presented in the independent claims 6 and 14. More specifically, the examiner has not found wherein harmonic components are identified in the physical variable (i.e. sound or vibration), then down-sampled to a lower update frequency. Wherein this down-sampled data is ultimately used to generate control commands for the purpose of controlling the physical variable as presented in claims 6 and 14. The general concept

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of down-sampling data was well known in the art at the time of the invention, as evidenced by Bazarjani et al (US 6,005,506) (see for example col.8 ln.37-59). However, the examiner has not found prior art that teaches or suggests the use of such down-sampling to be used in the control of sound or vibrations. Other prior art has been cited regarding the sampling of data to control sounds or vibrations. However, the other prior art of record also fails to teach or provide suggestion to arrive the combination of the elements and steps presented in the independent claims, again when said elements or steps are collectively considered in regards to each claim. For at least the reasons listed above, the dependent claims are also allowed in view of their respective dependencies upon the independent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason R. Kurr whose telephone number is (571) 272-0552. The examiner can normally be reached on M-F 10:00am to 6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on (571) 273-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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